Fermi National Accelerator Laboratory
LDRD Project Data Sheet - FY15

Project ID: FNAL-LDRD-2015-010
Project title: Dark Energy Survey and Gravitational Waves
Principal investigator: Marcelle Soares-Santos

Project description: (short description and explanation of cutting edge, high-risk, high-potential science or engineering)

The project is to perform a feasibility study of using the Dark Energy Survey (DES) to make an optical identification of a source of gravitational waves triggered by upcoming gravitational wave (GW) detectors that are planned to start taking data by the end of 2015. GW detectors are able to locate only with moderate precision the location of a source of gravitational waves. A dedicated search by DES which has a wide field of view and sensitivity in the near infrared optical bands may result in a pinpoint precision of the source of the gravitational waves allowing for much improved measurements of the source that would otherwise be lacking.

Tie to Mission: (explain the project's relevance or anticipated benefits to Fermilab's and DOE's missions)

Gravitational waves from coalescing neutron star binaries or black hole-neutron star pairs are potential new probes for dark energy and the physics of spacetime – areas of study directly related to the mission of Fermilab. This project will leverage existing DOE investment in the Dark Energy Survey Camera (DECam) and, if successful, be a demonstration of a new kind of probe relevant for high energy particle astrophysics

Previous year's accomplishments: (as applicable) FY15, not applicable

Work proposed for current fiscal year and anticipated / desired results:

The proposed work for the project for FY15 will be to modify the current DES supernova detection pipeline to work in the wide area survey region of the DES footprint over the larger region where a potential GW source might be. With this development, background rates, expected detection probability, and a search strategy can either be estimated, measured, or designed. If successful, the project will be in position for performing a pilot run once GW detectors are operational.

Project funding profile: (costs, budgets, projected budgets, and total)

Prior year(s) costs	FY15	FY16	FY17	Total
N/A	118867	161236	--	280103